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Recent Tests of QCD with the ATLAS Detector

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The ATLAS Collaboration has a large program to study various aspects of Quantum Chromodynamics starting from non-perturbative effects over diffractive physics to high precision perturbative calculations. In this talk, we review the latest results on Bose-Einstein correlations measured with the ATLAS detector along with an analysis of the momentum difference between charged hadrons in high-energy proton-proton collisions. The latter allows the investigation of observables sensitive to the predictions of the quantized string model.

Going to higher energy scales, we present first measurements of jet substructure quantities at a hadron collider, calculated at next-to-next-to-leading-logarithm accuracy. In particular, the soft drop mass is measured in dijet events with the ATLAS detector at 13 TeV, unfolded to particle-level and compared to Monte Carlo simulations. Perturbative QCD at highest energies can be precisely tested with the measurement of particle jet production of which we present the latest results based on data collected at a center-of-mass energy of 8 TeV and 13 TeV. In the absence of forward proton tagging, exclusive processes can be distinguished in the central part of the ATLAS detector exploiting the large rapidity gap in the central region and the absence of charged particles reconstructed in the inner tracking detector. This strategy has been exploited to study the exclusive production of dilepton pairs in the data taken at centre-of-mass energies of 7 TeV and the exclusive production of W pairs in the 8 TeV data. In this context, we also present the latest results on exclusive dimuon production at 13 TeV.

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